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structure of the sperms of the pteridophytes and the sexual processes in Onoclea, Cycas, Zamia, Ginkgo, Pinus, and for the angiosperms Helleborus and Lilium. Among these higher forms every month is bringing forth important papers and there are no cytological topics in which the ground has so frequently shifted and is still so unstable as that treating the events and significance of synapsis and heterotypic mitosis and the behavior of chromosomes during reduction and fertilization.

The work deserves special mention for its clear exposition of the chief theories of STRASBURGER on subjects associated with sexual reproduction. It is the most complete account of the speculations of this master published in English and should be very welcome to the general reader.

The book is very fully illustrated and the figures excellent, but they would have been even clearer if printed on a paper with a smoother surface.—B. M. DAVIS.

GUÉRIN[2] has brought together in a very useful way for French readers our information in reference to fertilization and associated phenomena in seed-plants. Spermatogenesis, oogenesis, and fertilization in angiosperms are first presented; and the same topics are taken up under gymnosperms, the Cycadales, Coniferales, and Gnetales being considered separately. In each case a brief historical résumé is given, and the references to recent bibliography are fairly complete, surprisingly so in the case of American publications. There are numerous illustrations, and the orderly presentation of topics makes the work very easy to consult. Of special interest in a work issued from GUIGNARD'S laboratory is the full presentation of "double fertilization." Brief concluding chapters deal with a comparison of angiosperms and gymnosperms as to the origin and development of the reproductive structures and the phenomena of fertilization, a comparison of the phenomena of fertilization in plants and animals, and a general interpretation of the phenomena of fertilization. The work is a compact organization of current knowledge, and should be of great service in calling the attention of French botanists to the more modern points of view in connection with seed-plants.—J. M. C.

Botany among the ancient Greeks.

WHILE ALL botanists have heard of THEOPHRASTUS, and know that he wrote a treatise on plants, it is safe to assume that only a few have taken the time to read him in the original. We have had translations of his 'Ιστορίαι τῶν φυτῶν, but now for the first time there is before us a critical study of this work, as well as the works of other Greek and Roman writers.[3] It appears that the stimulus for the Ιστορίαι was largely given by the reports brought back from India by those who accompanied Alexander the Great upon his journey of conquest.

[2] GUÉRIN, PAUL, Les connaissances actuelles sur la fécondation chez les Phanérogames. pp. vii + 160. Paris: A. Joanin et C^{ie}. 1904. 10 *fr*.

[3] BRETZL, HUGO, Botanische Forschungen des Alexanderzuges. 8vo. pp. xii + 412. *figs. 11. maps 4.* Leipzig: B. G. Teubner. 1903. *M* 12.

The original reports of the officers of this expedition are lost to the world, perhaps forever, but THEOPHRASTUS had access to them, and has presented their observations on plants, together with his own. BRETZL, the author of the work, believes that THEOPHRASTUS deserves to rank among the great botanists of the world, and that he was the only great botanist of antiquity, so far as we have record. PLINY, in comparison, is regarded as an inaccurate copyist. It is certainly remarkable that at the very earliest dawn of botanical study so many correct observations should be made, observations, too, which have commonly been lost sight of even until now. Nearly all of the important observations made by THEOPHRASTUS have been reported as original by modern botanists.

A few of the more striking contributions made by the Greeks may be here mentioned. Mangrove swamps were reported about the Persian Gulf, and this record is the only one we have of them; they have not yet been "originally" reported by modern botanists; SCHIMPER says that, with the exception of Avicennia, mangroves have not been seen west of the Indus. The descriptions of the mangroves are so exact that one has no trouble in making out the character species as we now know them. The zonal relations of the species were noted, Rhizophora being correctly regarded as the pioneer. It was inexplicable to them, as it is to us still, that plants, and particularly trees, could grow in salt water. Similar geographic studies were made in the deserts of Beluchistan, and there, as in the mangrove swamps, the character plants were described as such. THEOPHRASTUS used a series of leaf types in his descriptions, based largely on ecological features; more than two thousand years later, HUMBOLDT made out a similar series, and largely because of this has been generally regarded as the father of plant geography. The nyctitropic movements of the tamarind leaf are carefully described and are definitely termed sleep movements, distinction being made between leaves of that type and those of Mimosa. The banyan is correctly regarded as a fig, and the supporting roots are called roots and not stems, because they are leafless, and not green; their adventitious character is also noted. Compound leaves are so regarded in spite of the leaf-like appearance of the leaflets; the reasons given are the fall of the entire structure in autumn, and the fact that in the buds the leaflets are not differentiated. The sexuality of plants is clearly shown, especially in cucurbits and dates, and use is made of the terms male and female. Nearly two thousand years later, CAMERARIUS again showed the sexuality of plants, although it was late in the century just past before it was universally accepted.—HENRY C. COWLES.

Biological statistics.

DAVENPORT'S *Statistical methods*[4] has been revised and enlarged and made to embody all the more important recent developments in the mathematical analysis of variation in living organisms, as elaborated chiefly by PEARSON and

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[4] DAVENPORT, C. B., Statistical methods with special reference to biological variation. 2d. ed. 16mo. pp. viii + 223. *figs. 10.* 1904. New York: John Wiley & Sons. For review of first edition see BOT. GAZ. **28**: 364. 1899.